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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.



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THIRD YEAR OF PHENOTHIAZINE THERAPY FOR HORSES DESCRIBED

Low-level, continuous doses of phenothiazine administered to four mares for three years at the Kentucky Agricultural Experiment Station, at Lexington, Ky., gave practical control of intestinal worms without any harmful effect on the horses. This work substantiated the earlier findings of Drs. A. O. Foster and R. T. Habermann of the U. S. Bureau of Animal Industry who reported their observations on controlling horse parasites with repeated small doses of phenothiazine in 1944.

The Kentucky experiments were conducted by Dr. A. C. Todd and his associates in the Department of Animal Pathology of the station, and are being continued for the rest of the lives of the four horses. The results of the third year of the Kentucky test were described by Dr. Todd in the January, 1952, issue of VETERINARY MEDICINE, and a summary is given here with his permission. (Dr. Todd is now at the University of Wisconsin.)

Results of the first two years of the test, based on three Kentucky reports, were described by Dr. Donald C. Boughton of the Animal Industry Section of the Grasselli Chemicals Department in the July-August, 1951, issue of the AGRICULTURAL NEWS LETTER. A few reprints of that article are available, and may be obtained by writing the editor of this publication.

Experiment Started With 12 Horses

The series of experiments began in April, 1948, with 12 mares ranging from two to 18 years old. Its purpose, as explained by Dr. Todd, was "to determine the effect of continuous low-level phenothiazine therapy on the physical well-being of horses and on their strongyle parasites". Strongyles are hardy parasitic worms of the Strongylidae family. Nearly all horses have some strongyles somewhere inside their bodies.

The twelve horses were divided into four groups, which were daily fed 0.5, 1, 2, and 4 grams of phenothiazine, respectively. This low-level dosage contrasts with therapeutic doses of 30 grams (given over a 5-day period).

Four horses -- one in each group -- were sacrificed at the end of the first year for postmortem study. The eight remaining mares were fed the same dosages for another year. At the end of the second year, four more mares were sacrificed for complete postmortem examinations.

Program for Third Year of Test

The number of strongyles carried by the horses was significantly reduced in the two-year tests, particularly in the groups which received doses of two and four grams daily.

In the third year of the test, Dr. Todd fed the four remaining mares -- ranging from five to 11 years old -- doses of two grams per day. "The horses were not sacrificed at the completion of the third year but are being held in order to

continue daily treatment for the rest of their lives", Dr. Todd explained in the VETERINARY MEDICINE article.

The degree of control obtained with this low-level regimen of phenothiazine was determined by taking worm egg counts at four week intervals during the test. These counts were made by examining the fecal droppings under the microscope. Thirteen counts were taken between May 17, 1950, and April 25, 1951. Dr. Todd's data showed that complete control of the strongyles was obtained in three of the four horses.

Results With Each Horse Described

Here are the results obtained, on the basis of the table and descriptive matter published in VETERINARY MEDICINE of January, 1952:

The first horse was a seven-year-old mare, which had been fed 0.5 grams of phenothiazine daily for the first two years of the test. Like all the others, she was fed two grams per day during the third year. She started out with a worm count of 144 on May 17, 1950. This dropped to 16 on June 16, rose to 32 on September 12, dropped to 16 on October 10, fell to zero on November 8, rose to 16 on December 4, dropped to zero on January 3, 1951, rose to 16 on January 29, and was at zero for the remainder of the time. Dr. Todd commented that her counts "show an almost complete disappearance of strongyle infections."

The second horse, a five-year-old mare, had been fed 1 gram of phenothiazine daily for the first two years. She started out her third year without any strongyle egg count; had 32 on November 8, dropped to zero on December 4; rose to 16 on January 29, 1951; dropped to zero on February 28; had 16 on March 28 and none at the end of the test. "Her strongyle infection was well controlled in the third year," Dr. Todd said.

The third horse was a six-year-old mare, which had received two grams of phenothiazine daily during the first two years. This, therefore, was the only horse to receive the two gram dose for the entire three years. She started out with an egg count of 32 and ended with a count of 32. It ran as follows: 32-0-0-0-64-48-32-16-48-48-0-0-32. "Her strongyle record is the poorest of the four horses," Dr. Todd said.

The fourth horse, an 11-year-old mare, had received the maximum dose of 4 grams per day during the first two years. She received 2 grams daily during the third year. Her record on the table is a collection of 13 zeros. "No strongyle eggs were observed in any of her fecal samples. Actually, this mare's fecal samples had been negative from October 10, 1949. The record obtained from the 11-year-old mare is considered evidence of the failure of a species of strongyle to develop an immunity to phenothiazine therapy which might be indicated in the record of the six-year-old mare," Dr. Todd commented.

Horses in Excellent Condition During Tests

After noting that the tests conducted at the station in Lexington, Kentucky, had proceeded under "particularly fortunate circumstances," Dr. Todd

added these observations:

"The three years of the test have not been marred by accidental injury to the horses. The horses have not developed bacterial or viral infections of such natures as would interfere with the test. Actually, each horse has remained in excellent condition. Each horse produced a normal, healthy foal in the spring of 1950. Each horse was successfully bred in the spring of 1950 and foaled in the spring of 1951, except for the 11-year-old mare whose pregnancy was not at full term by mid-May. The five-year-old mare's foal was a 'sleeper foal' and died a few days after birth. Regular blood examinations of the four mares have not disclosed any hemolytic anemia due to phenothiazine therapy. The animals have remained alert and have displayed no inappetence."

TWENTIETH ANNIVERSARY OF AGRICULTURAL NEWS LETTER

With this issue we complete Volume 20 of the AGRICULTURAL NEWS LETTER -- which means it has completed 20 years of its work of telling a little about agriculture and agricultural chemicals. In all this time we have tried to keep it on an informal -- and we hope informative -- basis.

Our publication started out modestly in 1933 with an issue of four pages. It referred to itself simply as "This Brief News Letter." The name "Agricultural News Letter" was adopted with the issue of March 15, 1934.

The late Frank J. Byrne was the first editor. Samuel W. Long of West Chester, Pa., was the second editor, from 1935 until his retirement in 1938. Larry F. Livingston was editor from 1938 to 1942, and has since then continued in charge as manager of the Extension Division of the Public Relations Department. Gus M. Oehm, now of the Hawaiian Pineapple Research Institute at Honolulu, was editor from 1942 to 1949, when he was succeeded by William H. Lander.

An editorial in the March 15, 1934 issue explained that the publication intended to give "information on new developments of interest to agriculture, based on the work done by chemists and technical men of the Du Pont Company ... Also news on field and agricultural experiment station work in the control of plant diseases and crop pests." This policy still stands. We have not changed it, or the familiar blue cover, in these 20 years.

AGRICULTURAL CHEMICALS TESTED
UNDER FAR WESTERN CONDITIONS

By R. M. ROBERTS

About a mile south of Cupertino, California, lie 15 acres of orchards and field crops which annually receive treatments not generally accorded other farm land on the West Coast.

If the trees, berries, vegetables, and forage crops on those 15 acres could talk, the experiences they would relate might predict to some extent the degree of control western growers will have over insect pests, plant diseases, and weeds several years from now. For this is the Far Western experimental farm of the Du Pont Company for the testing of new products in the field of agricultural chemicals.

Called the San Jose Experimental Station, this small farm was purchased by Du Pont in the fall of 1948. The location was chosen after more than a year of studying climatic conditions, farming practices, and the more serious insect, disease, and weed problems of the far western states. Situated in the fertile Santa Clara Valley, it affords an opportunity to work with a wide range of crops, from semi-tropical plants and citrus to apples, pears, and other crops usually grown in sections with more severe winter temperatures.

All Types of Chemicals Tested

When acquired, the property was planted to a variety of tree fruits, the majority of which were French prunes. During the past three years, about half the acreage has been replanted. Today such tree crops as apricots, walnuts, peaches, almonds, apples, pears, cherries, and prunes are grown. A section is devoted to raspberries, boysenberries, strawberries, and grapes. Another area is planted each year to a variety of vegetable crops such as corn, broccoli, lima beans, etc.

This diversification of crops is necessary to provide a range of plants on which to test the many experimental insecticides, fungicides, and weed killers which are evaluated at this "laboratory."

Millard Swingle, a graduate of The Ohio State University, is in charge of this experimental work. He spent 15 years with the U. S. Department of Agriculture and four years at Du Pont's pest control research laboratory in Wilmington, Delaware, before coming to the West Coast in 1947 as area supervisor for the company's agricultural product development section.

Six Western States Included in Tests

Three more Du Pont agricultural specialists assist Mr. Swingle in a program which encompasses the states of Washington, Oregon, Idaho, Nevada, California, and Arizona. Lyall F. Taylor and Fred H. McDiarmid make their headquarters at the Cupertino farm. C. R. Hunt covers the Pacific Northwest from his recently established field headquarters at Corvallis, Oregon.

The farm crops serve as an initial proving ground for new chemical compounds developed through Du Pont research. If these compounds perform well at the San Jose Experimental Station, they are next tested under large-scale operation methods throughout these six western states. These are cooperative tests conducted with progressive farm and ranch operators to determine whether the chemical will do its job under typical commercial practices.

Federal, State, and College Investigators Cooperate

This Du Pont research team also keeps in close touch with federal and state investigators -- U. S. Department of Agriculture men in this region, state college experiment station personnel, and extension service workers. Many of the actual field tests are conducted in cooperation with such investigators. Supplies of new compounds are made available to these state and federal experimenters for their own evaluation. Through conferences and the exchange of test data, experimental dosages of the chemicals are determined. New applications for both new compounds and established products may result from such evaluations, often increasing their value to agriculture.

Many new chemicals for agriculture were developed last year. A good many questions need answering before these can be placed in general use. Do they control insects, diseases, or weeds, at a cost which makes them profitable for the farmer? Will they damage crops if used carelessly? Can they be applied with safety to the operator, and do they leave a hazardous residue on the crop at harvest time? How will harvested crops from treated plants be graded in the competitive market in which they must sell -- do these chemicals help improve quality as well as quantity? These and many other answers are being sought. And every time an experimental chemical comes up with the "right answers," another big step is taken in cutting down the damage caused by bugs, diseases, and weeds on farms and ranches.

Because of the high cost of grains, dairymen are becoming more and more interested in using forage to supplement the grain rations fed to their dairy cows. Good hay is needed for this purpose, as ordinary forage lacks sufficient nutritive value. This situation has led to an increasing use of insecticides on forage crops, both to increase the yield and improve the quality of the leaves of alfalfa and other forage crops. But not all insecticides are suitable for this purpose. Tests in Utah with methoxychlor showed that it controlled weevil larvae; that the yield in treated plots was greater than in untreated, and that methoxychlor residues on the hay presented no hazard to the cows which ate it, and did not appear in their milk. With the permission of the authors, a condensation of a description of the experiment is given below.

DAIRY COWS UNAFFECTED BY EATING
METHOXYCHLOR-TREATED ALFALFA HAY

Methoxychlor residues on alfalfa hay treated with that insecticide did not appear on the milk of eight dairy cows eating it in tests conducted at the Utah Agricultural Experiment Station at Logan by Dr. Clyde Biddulph and his colleagues.

Four of the cows which were slaughtered in connection with the test also showed no measurable amounts of methoxychlor in their blood or tissues. These and other results of the tests were described in the May, 1952 issue of "Journal of Dairy Science" by C. Biddulph, Professor of Physiology, Utah State Agricultural College, G. Q. Bateman, Professor of Dairy Husbandry, J. R. Harris, Research Associate, F. L. Mangelson, Research Associate, F. V. Lieberman, Entomologist, U.S.D.A., W. Binns, Professor of Veterinary Science, and D. A. Greenwood, Professor of Biochemistry.

In earlier tests conducted at the Utah station, involving the use of DDT on alfalfa hay, it was found that significant amounts of DDT did appear in the milk and body fat of dairy cows which ate the hay.

In the tests with methoxychlor, it was found that the alfalfa weevil larvae were controlled at an economic dosage and that there was a measurable increase in the yield of treated alfalfa.

Effect of Methoxychlor on Alfalfa

Sixteen plots of one and a half acres each were used to grow the alfalfa for the test. These plots were divided into four blocks with four plots each. One control plot in each block was left untreated. The other three in each block were treated with methoxychlor on June 6, 1949 at the levels of 1, 2 and 2.8 pounds per acre. The insecticide was applied by power duster, with pyrophyllite used as a carrier.

"All three dosages provided adequate protection," said the authors of the paper, "the two higher treatments giving excellent control for 14 days after application." The increases and decreases in the weevil population, and the percentage of control obtained, is shown in the following table, taken from the Utah report:

Treatment (Dosage of Methoxychlor)	Weevil Population			
	Day of Dusting (June 6)	Days after treatment		
		4	9	14
None	740	1,722	2,599	2,138
1.0	503	131	287	304
2.0	547	91	169	153
2.8	764	68	223	180

It had been planned to cut the alfalfa on the 15th day after application, but rain delayed this for eight days. Although this circumstance may have reduced the residue somewhat, the Utah scientists gave data from other experiments which indicated that the results were not out of line. They are given in table form as follows:

AVERAGE YIELD AND RESIDUE ON ALFALFA HAY TREATED WITH METHOXYCHLOR

Methoxychlor applied per acre (lb.)	Yield (Tons per acre)	Methoxychlor residue (ppm.)
0	1.22	0.0
0.1	1.52	7.0
2.0	1.31	9.5
2.8	1.36	14.0

The table shows that the amount of residue was relatively small, as it has been estimated that a rat would have to eat a diet containing 100 parts per million of methoxychlor before the insecticide would appear in the body fat of

the rat. The table also shows that the treated plots gave a higher yield of alfalfa than the untreated ones.

Feeding Test Lasted 113 Days

After the alfalfa was cut, it was raked into windrows and allowed to sun-cure, then baled.

The feeding trial started on December 18, 1949, and continued until April, 1950. It involved eight Holstein dairy cows. Two cows ate untreated alfalfa, and two ate alfalfa treated with each of the three dosages of methoxychlor. The remainder of their diet consisted of a mixture of 80% barley and 20% molasses-dried beet pulp, to which was added 2 per cent steamed bone meal and 1 per cent fine hay salt (NaCl).

"Analyses of milk from the eight cows, which were made at approximately weekly intervals throughout the period of feeding, showed that there was no methoxychlor at any time," said the report.

"No methoxychlor was found in the blood before or at the end of the feeding period," it added.

Four cows -- one representing each group -- were slaughtered for analysis at the end of the feeding period. "There was no methoxychlor in kidney fat, kidney, liver or muscle of cows fed either treated or untreated hay," according to Dr. Biddulph and his colleagues.

They also reported that the methoxychlor-treated hay had no apparent effect upon the health of the cows, and did not affect their milk or butter fat production, or their feed consumption.

SHOULDER PAD FOR HUNTERS
DIMINISHES GUN RECOIL

Hunters will find comfort in a shoulder pad molded of neoprene sponge rubber designed to cushion gun recoil by spreading the force over a large area. It minimizes jolts to the shoulder and keeps the butt plate from gouging and leaving bruises.

Neoprene, Du Pont's chemical rubber, was chosen for the cushion because of its elasticity, resilience, and long life. Known as the "Sub-Du" Recoil Pad, the cushion helps to improve marksmanship by relieving fear of recoil, tenseness, and stiffness of the body. For quick attachment, the pad comes in a cloth container with buttonholes and three buttons to be sewed inside the hunting coat or shirt. Safety pins are also furnished for the convenience of bachelors.

DU PONT SURVEY SHOWS WOMEN
PREFER FRACTIONAL PACKAGES

Ninety-three per cent of the women who regularly buy saltines in fractional, or inner sealed unit, packages prefer this type of packaging because crackers keep "fresh and crisp", according to a recent Du Pont consumer survey.

A majority of the women interviewed also said they would like to be able to buy graham, oyster, cheese, wheat and cocktail crackers; and vanilla, chocolate, marshmallow, tea, sandwich and fig bar cookies in unit packages.

Other reasons why women prefer crackers and cookies in fractional packages, the survey reported, were: "they get stale and soggy in present packages"; "fractional units minimize breakage....are more economical because they can be purchased by any size family"; and "several varieties can be kept on hand".

Laboratory Tests Also Made

Du Pont also made a laboratory test which measured the actual protection afforded crackers fractionally packaged in cellophane and in another widely used packaging material. During a 12-week period, frequent analyses were run for moisture content. Taste and crispness tests also were made by panel members who were unaware of the type of packaging used for the samples.

Tests of crackers taken from overwrapped boxes, containing fractional units packaged in cellophane and in the other material, demonstrated that the crackers were still salable during the 12-week period. After six weeks, however, crackers packaged in cellophane units were crisper than those wrapped in the other material.

Another test simulated storage by consumers who do not use an entire box: crackers taken from open boxes showed that cellophane packed units not only tasted better but were satisfactorily crisp. Crackers packaged in the other material, the test proved, began to lose their crispness after four weeks.

USE OF INSECTICIDES HELPS
REDUCE STORED GRAIN LOSSES

The importance of cutting down losses of grain due to insect infestation during storage is stressed in "INSECTS", the recently published Year Book of the Department of Agriculture for 1952.

Insects, in one way or another, are credited with destroying 5 per cent of the world production of cereal grains.

In the Great Plains, loss of stored wheat may run as high as 10 per cent in a season.

In just one month, corn in storage in the deep South may suffer a loss of 9 per cent.

These illustrations are contained in an 11-page study on "Insect Pests of Stored Grains and Seed" by R. T. Cotton, veteran entomologist of the Bureau of Entomology and Plant Quarantine of the Department of Agriculture and Wallace Ashby, agricultural engineer, of the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Continual Battle Against Insects

Man's efforts to cut down insect losses in the fields have gone on for many years, but until a few years ago relatively little attention had been paid to a systematic reduction of the losses of grain in storage due to insect infestation. A seven-point program to help cope with this problem was outlined in the AGRICULTURAL NEWS LETTER of July-August, 1952.

The importance of the battle against the insects that attack stored grain is described by Messrs. Cotton and Ashby as follows:

"The steady rise of population in this country and the increasing demand placed on us to share our food supply with people of other nations makes it imperative that we conserve as much as possible of our harvested crops..... As we learn more and more about sprays, fumigants, control of grain moisture, and the habits and weaknesses of the insects themselves we are better able to meet their threats."

One of the fortunate aspects of the situation is that the very condition that is good for stored grain -- having as little moisture as possible -- is unfavorable for the development of insects.

"The true grain weevils", said the article, "cannot breed in grain that has a moisture content below 9 per cent, and their breeding is greatly restricted in grain unless the moisture content is above 11 per cent. The bran beetles..... do not breed in clean seed unless the moisture content is 11 per cent or above or the temperature is above 80°F....." It lists the principal attacking insects by regions. A summary follows:

Principal Insects Which Attack Stored Grain

In the commercial corn area of Illinois, Iowa, Nebraska, Minnesota, and South Dakota, 98 per cent of the insects found in stored shelled corn were of six species -- the saw-toothed grain beetle, flat grain beetle, red flour beetle, foreign grain beetle, larger black flour beetle, and hairy fungus beetle.

In the Great Plains hard winter region, 90 per cent of the insects attacking wheat in farm storage were of seven species -- the flat grain beetle, saw-toothed grain beetle, lesser grain borer, red flour beetle, long-headed flour beetle, cadelle, and rice weevil.

"Along the eastern seaboard the Angoumois grain moth is occasionally one of the common pests of stored wheat, although ordinarily the flat grain beetle and the rice weevil are the main species there."

Stored corn in the South is attacked principally by the rice weevil. Field infestation is common in the South, but not in the other regions.

Requirements for Good Storage Conditions

One of the principal requirements for good results in a campaign to control insects in storage is to have good bins. The requirements set down by Messrs. Cotton and Ashby are as follows:

"To be satisfactory, a bin must hold the grain without loss of quantity; exclude rain, snow, and ground moisture; afford reasonable protection against thieves, rodents, birds, poultry, insects, and objectionable odors, such as might be caused by fertilizers, chemicals, dusts, gasoline, or kerosene; permit effective fumigation to control insects; and provide reasonable safety from fire and wind damage."

How to Prevent Infestations of Grain

After the harvest, grains should be stored "in clean insect-proof, weather-proof storage on premises from which nearby sources of insect infestation have been eliminated. Steel bins.....are best....

"Wooden bins," continued the article, "should be thoroughly cleaned and the walls and floors treated with a residual spray before they are refilled. This will kill most of the insects that emerge from burrows and cracks in the woodwork. Steel bins should be thoroughly cleaned. It is not necessary to spray the entire bin, but it is advisable to spray around the door frame where insects may be concealed. Wooden-crib elevator bins should also be sprayed."

The most recent recommendations of the United States Department of Agriculture regarding sprays, announced in Washington on May 7, 1952 are:

"DDT and methoxychlor sprays at 2½ per cent concentration, and sprays containing 0.5 per cent pyrethrum or allethrin are recommended by the USDA's Bureau of

Entomology and Plant Quarentine. The methoxychlor (*), pyrethrum, and allethrin sprays are considered entirely safe and can be used according to directions without fear of health hazards, the entomologists said. All of these sprays should be applied at the rate of 2 gallons per 1,000 square feet of wall or floor surface. However, DDT sprays should be used with caution and applied only at recommended dosages. While the evidence available does not indicate that the use of DDT in grain bins is a health hazard, further investigations are underway to determine the exact amount that might rub off the walls onto the grain."

In INSECTS, it is recommended that "farm stored grains be fumigated within two weeks after placing in the bin in the South and within six weeks in the central part of the United States. In the North, fumigation after storage may not be necessary but is good insurance against infestation."

The Department of Agriculture publication INSECTS noted that it "is just as important to clean up the premises of country elevators and spray empty wooden bins with residual sprays as it is on the farm. The same sprays and dosages recommended for farm bins should be used. At times when most bins are empty the entire elevator can be fumigated." Similarly, it is recommended that infested railroad cars be thoroughly cleaned out with compressed air, after which a residual spray may be applied.

While much research in the field of insect pests in stored grain remains to be done, the authors feel that "we are more than holding our own against these pests."

(*) Du Pont offers two formulations of methoxychlor insecticide: "Marlate" 2-MR 24% technical methoxychlor -- a liquid insecticide and "Marlate" 50 -- a 50% methoxychlor wettable powder.

INDUSTRIAL STRENGTH CONSTITUTES
ASSURANCE FOR PEACE AND PROGRESS

A strong, productive industry is the nation's greatest safeguard for peace, its greatest instrument for progress, and a most necessary basis of defense, Crawford H. Greenewalt, president of the Du Pont Company, said recently.

"Therefore, any action which hampers, retards, and weakens American industry, also hampers, retards, and weakens our peace, our progress, and our defense," he declared.

"Obviously no one starts a fight he does not think he can win," he said. "World War III will be upon us only when some aggressor perceives weakness. So let there be no doubt as to the strength of our industrial defenses and no doubt as to the determination of the American people to keep them that way.

"If we are to have a strong and productive industry in time of war, we must have a strong and productive industry in time of peace," Mr. Greenewalt added.

Victory In War Determined Years In Advance

Pointing out that modern warfare is a conflict between the productive strength of nations as much as it is a conflict of men, he declared that "wars may be won or lost years before the actual outbreak of hostilities," if the industrial establishment that supplies the means is ever permitted to deteriorate.

"Industrial strength, like an individual's, is cumulative. It cannot be developed overnight," he declared. "The defense of the nation can never be secured by creating new industrial potential for military purposes; the problem is essentially one of conversion, of adaptation, of taking what we have and using it as effectively as possible."

Speaking in New York at the annual meeting of the National Security Industrial Association, an organization which provides the Defense Department access to the know-how of industry, Mr. Greenewalt said industry meets the needs of defense by two general methods: converting facilities to military purposes and diverting peace-time products to war needs. But the driving force behind production is the special abilities of people, "the result of long years of training and experience." Back of them is the research, without which "industry loses its vitality and dynamic character" but which takes many years as "the product of patient men and patient money."

The World War II "miracles" of dramatic expansion and the training of millions of workers were accomplished by industry "only because it had behind it the technology and trained manpower accumulated during the peace-time years," he declared.

Favorable Climate For Industry Is Essential

At the start of the war, "our military explosives supervisory personnel

could all have sat down together in one small room. To do what was required of us, we transferred some 1,500 supervisory and technical personnel from other activities," Mr. Greenewalt recalled. "We had the talent -- it was necessary for us only to change the direction of its activities."

At the new Savannah River plant in South Carolina which Du Pont is building and will operate for the Atomic Energy Commission there are already 1,800 technical and supervisory personnel on the job. They were transferred there from "such non-atomic and non-military activities as paints, insecticides, textile fibers, motion picture film, cellophane, dry-cleaning fluids and so on," he said.

"Our strength at war is no greater than our strength at peace. And so it becomes a matter of simple self-preservation to do everything at all times to maintain an atmosphere that will keep our industrial strength always at peak power. But industry can flourish only in a climate favorable to its growth and well-being."

That climate "is the heady, stimulating atmosphere of freedom," he said. "To industry, freedom means simply an absence of artificial restraints upon its natural, lawful functions. It means the right to make its own decisions on matters properly within its province. It means the right to offer sufficient incentives to its people."

Industry Must Constantly Go Forward

"We have ample evidence that an industry deprived of these will decline," he said, reminding his audience of the post-war investigation in Germany which found that industry, under state control, could not marshal the human effort necessary for victory.

Industry "cannot be put up in mothballs, awaiting the next call upon its services", Mr. Greenewalt declared. "It can never remain static. The forward movement of industry is an essential element of national superiority either in peace or in defense."

"Technology is as vital to defense as strategy. Strategy may, if necessary, be improvised; technology, unfortunately, cannot. Industry was able to produce so abundantly in World War II only because it had for a long period of time been developing the techniques and the organization that insured success."

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